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TO: Federal Communications Commission

RE: BPL (ET Docktets 03-104 and 04-37)

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Present rules regarding Carrier Current Systems (CCS) may be
suitable for LF applications but should not be applied at HF.
This is because radiation terms can usually be neglected at LF
but become predominate with increasing frequency.

For CCS purposes, a power line should be considered as single
horizontal wire above ground at height, h, with an image conductor
below ground at depth, h, with opposing current. In the plane
of this array, at some point, p, at a distance, r, from ground, note
that the distances are r - h from the wire and r $\neq$ h from its image.

For an h of 0, thfixi the fields at p generated by currents in
the conductor and its image would cancel since the currents are
opposing. For h greater than 0, the fields would still cancel.
But not exactly. This is because the speed of electromagnetic
radiation is finite. There would be a delay of 2h/c where
c is the speed of light or 9.82-E/08 feet/second. Assuming a
utility-pole height of 40 feet, the delay would be 80/c or81.5 ns.

The phase shift resulting from this delay can computed from
ϕ equals 360*f*(delay). For a frequency of 200 kHz, the phase
shift ϕ would be 5.86°. The component resulting from the delay
can be computed from 2SIN(ϕ/2) giving a relative value of0.102.
This number represents energy irretrievably fransxthe lost in
the form of radiation. But the value is still low (-19.8 dB)
compared to an uncancelled component (a value of 1.0). Considered
somewhat differently, the power line is only 0.0163 wavelengths
above ground and most would conclude it would be a very poor antenna.

On the other hand, things changexad radically at HF. For example,
at a frequency of 3 MHz, the same power line would be 0.24 wavelengths
above ground. In this regard, a wire up at utility-pole height
would be the envy of radio amateurs, short-wave listeners, and others
who use the HF spectrum but not BPL operators!!

While perhaps a misnomer, the term, "point source" should be confined
to CCS systems where components die away as $1/r^2$, $1/r^3$ or in higher
terms but where 1/r terms can be neglected. Separate rules are
needed where radiation is a significant factor.

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